Remarks

Claims 12-22 and 24-28 are now pending in this application. Applicants have canceled claim 11, amended claims 11-15, 17-19, 21, 22, and 24-26 and added new claim 28 to clarify the present invention. Applicants respectfully request favorable reconsideration of this application.

The present invention as recited in newly presented independent claim 28 provides a construction element for a sectional bowling lane. The construction element includes at least one supporting structure layer comprising a cellular board. An impact-resistant board layer is attached to opposite sides of the supporting structure layer. At least one laminate layer is attached to the board layer on at least one side of the supporting structure layer. The construction element is configured to be operatively connectable to at least one other construction element.

The present invention is directed to a bowling lane construction element. As such, the construction element is capable of withstanding the forces that a bowling lane typically encounters. Due to its unique construction, the present invention can greatly reduce the weight of a bowling lane as compared to known bowling lane constructions. Also, the present invention makes it possible to erect a lane for temporary use. The present invention also provides a very stable bowling lane construction. The invention represents a completely new way of thinking in the field of bowling lanes that none of the cited references disclose or suggest.

The Examiner rejected claims 11-27 under 35 U.S.C. § 103(a) as unpatentable over

Brunst in view of Beamish and further in view of Honeycomb Products and Paneltec.

Brunst describes the requirements of a bowling lane including straightness and impact resistance. Brunst's suggests a composite panel for a bowling lane. To address issues of impact resistance, Brunst suggests sealing an entire wooden element, made flat by sanding, inside a protective durable laminate. Once the lane element reaches the end of its life span, Brunst suggests changing the element.

The solution suggested by Brunst has not been commercially successful in the more than twenty years since its issue. This is demonstrated by the fact that it is still common practice to sand lanes regularly to maintain their flatness.

While honeycomb structures are known, their vulnerability to impact is also known. This vulnerability was described in *Symposium on Recent Developments in the Study of Impacts on Composite Materials*, held at Virginia Tech in June 1999, as well as on the website of Finite Element Analysis, Ltd., which was last modified on March 17, 2003. An abstract submitted in conjunction with the *Symposium on Recent Developments in the Study of Impacts on Composite Materials* is attached hereto. This abstract entitled *The formation of Barely Visible Impact Damage in Honeycomb Sandwich from a Soft Body* describes that composite materials, such as Nomex honeycomb composite, have relatively low resistance to impact damage. The website of Finite Element Analysis, Ltd., under the tradename LUSAS, goes further, stating that honeycomb sandwich panels "are generally poor at resisting impact damage."

In view of the statements, it is clear that the low impact resistance of honeycomb panels is known and was known at the time the present invention was made. These facts provide sufficient evidence that it would not have been obvious at the time the present invention was made to employ cellular structures in a bowling lane. It follows that it would not be obvious to combine the references in the manner described in the office action.

Simple face plates applied on honeycomb panels are not sufficient to prevent damage. Based upon the comments in the office action, the Examiner appears to assert that the face plates 12 and 13 suggested by Beamish suggest the board layer of the present invention. Such faceplates are light facings on each side of the honeycomb core and do not contribute to the physical characteristics of the core. As can be seen in the drawing figures of Beamish, the face plates are sufficiently flexible to be processed as continuous webs.

Those of ordinary skill in the art would be well aware of the stringent requirements for bowling lanes, such as a crosswise tilt of less than 0.004 inch over the width of a lane. This is demonstrated by the attached rules governing bowling lanes. One of ordinary skill in the art might be aware of cellular structures used in other fields. However, as is apparent from the reference materials attached hereto, one of ordinary skill in the art would also know of the susceptibility of such structures to damage from impacts. As described in *Symposium on Recent Developments in the Study of Impacts on Composite Materials*, at first, dents would appear and then the cellular structure would start to lose its strength.

In view of the above, rather than assuming stupidity as the Examiner asserts in the office

action, Applicants assume intelligence on the part of those of ordinary skill in the art, to whom it would not be obvious to construct a bowling lane element out of low impact resistance honeycomb structure. Those skilled in the art know that bowling balls are heavy and are repeatedly thrown on to bowling lanes. As a result, it would be unexpected to those skilled in the art that bowling lanes including honeycomb panels would be able to sustain such damage.

It would not evident to produce the construction element according to the present invention or a bowling lane that includes such a construction element based upon the cited references. The present invention provides a construction element that it would be presumed would be spoiled by impacts and lose its strength. The present invention also provides an element that is quite expensive as compared to wood or wood-containing boards. Along these lines, honeycomb structures are still quite expensive, even if prices have come down in the recent past. However, they are still expensive enough that assert that panels including honeycomb structures would be used and thrown away is not reasonable. The present invention fulfills the requirement of bowling lanes and is light and possesses resale value.

With respect to the Honeycomb Products web site, the evidence supplied by the Examiner indicates that the Honeycomb Products logo appeared on the web site in 1997. However, the text on the site was modified on December 24, 1998, which is after the priority date of the present application. Furthermore, the contents of the Honeycomb Products web site does not suggest a bowling lane or any solution to the low impact resistance of such products that would make them useful in a bowling lane. The Applicant criticizes the use of kraft paper because when combining the teachings the proposed modification renders the prior art even more

unsatisfactory for the intended purpose. Along these lines, the impact resistance of honeycomb structures is poor, regardless of the material of the honeycomb or the type of body. This is well documented in the art.

With respect to the Paneltec reference, these pages were published in June 2001. These pages state that honeycomb lamination is relatively new. While the Applicant has never suggested that honeycomb structures are new, a bowling lane construction element and a bowling lane formed of such construction elements is new. With respect to cost, honeycomb panels are still more expensive than materials typically used in bowling lanes. Additionally, with respect to buckling and warpage, while Beamish does recognize that these are a problem, resistance to torquing and bending described by Paneltec are a different problem. Along these lines Beamish is describing a problem in manufacturing methods and Paneltec is describing problems inherent in the structure.

At the time the present invention was made, no commercially available panel was suitable for a bowling lane. Seizing upon a new way of thinking, the Applicants developed a new construction element from materials known to have poor impact resistance. This way of thinking and the resulting structure are contrary to the prior art.

The present invention also provides a lightweight element, weighing just 100 kg as compared to 195 kg for known structures, as described at page 6, lines 1-10 of the specification. As a result, the laminate and board layers of the present invention need to be considerably thinner in the present invention, which is contrary to the knowledge of those skilled in the art.

One of ordinary skill in the art would know that two board layers that are positioned loosely on top of each other and have a laminate layer on the surface of the uppermost board are sufficient for attaining a reasonable lane construction, but that repairing is required from time to time. Addition of a cellular layer, which has poor impact resistance and at the same time making the board layers and laminate layer thinner and joining all of those layers together to prevent resurfacing is illogical based on the prior art.

However, unexpectedly, the present invention has proved to maintain its straightness. Also, the present invention has proven to be highly resistant to dents because the board layer, which is attached to the supporting structure layer, spreads the impact force into the plane of the board layers. Furthermore, the present invention makes it possible to optimize the impact resistance, the thickness of the various layers and the weight of the construction element in different sections of a bowling lane.

In view of the above, the references relied upon in the Office Action, whether considered alone or in combination, do not suggest patentable features of the present invention. Therefore, the references relied upon in the Office Action, whether considered alone or in combination, do not make the present invention obvious. Accordingly, Applicants respectfully request withdrawal of the rejection based on the cited references.

In conclusion, Applicants respectfully request favorable reconsideration of this case and early issuance of the Notice of Allowance.

If an interview would facilitate the prosecution of this application, Applicants respectfully urge the Examiner to contact the undersigned at the telephone number listed below.

The undersigned authorizes the Commissioner to charge fee insufficiency and credit overpayment associated with this communication to Deposit Account 19-5127, 19380.0006.

Respectfully submitted,

Date: 11-18-03

Eric J. Franklin, Reg. No. 37,134
Attorney for Applicants
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3000 K Street, NW, Suite 300
Washington, DC 20007
Telephone: 202-424-7500

# INDEX

# REGULATION BOWLING LANE

A regulation bowling lane, including flat gutters, kick-backs and approach, must be constructed of wood and/or other materials which have been tested according to ABC/WIBC procedures for the specified time period and approved.

## Synthetic Products:

All non-wood material used in the manufacturing of lane components must be presented to ABC/WIBC for evaluation and possible testing before use in sanctioned competition. If approved. they may not be altered by the use of coatings, etc. unless these coatings have been p-resented to ABC/WIBC for evaluation and possible test-ing. In addition, all products must contain an approval label with the following requirements:

1. The label must be permanent, lasting the life of the product.
2. The label must be clearly visible after the product is installed in the bowling center.
3. The label must identify the company as the manu-facturer.
4. The label must contain an approval number as-signed by ABC/WIBC and state "ABC/WIBC Approved."

## Approach:

Extending from and exclusive of the foul line there shall be an unobstructed level approach which shall be:

1. Not less than 15 feet in length
2. Free from depressions exceeding 1/4 inch.
3. Not less than the width of the lane.

## Foul Line:

The foul line shall be:

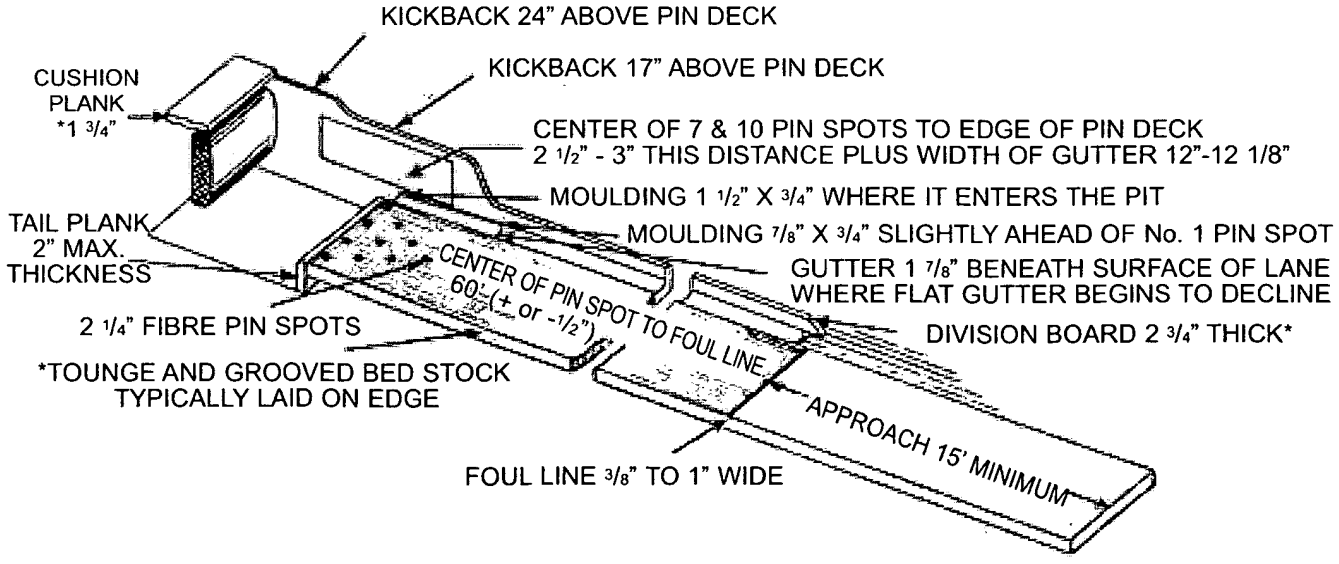
1 Not less than 3/8 inch nor more than 1 inch in width.
2. At a minimum, the entire width of the lane.
3. Distinctly marked upon or embedded between the lane and approach.

   It may be required that the foul line be plainly marked on the walls, posts, division boards or any point on a line with the regular foul line.

(For more information on the foul line see the section on Automatic Foul Detecting Device.)

### ABC/WIBC Regulation Bowling Lane Dimensions

Typical Cross Section of Bowling Lane—Round Gutters from foul line to pin deck area.




*NOTE: This particular measurement is not an ABC/WIBC specification but is an accepted standard for installing bowling lanes.

## Composition:

The lane must be constructed entirely of wood and/or synthetic materials which have been approved by ABC/WIBC.

## Length:

1. The overall length of a regulation lane, including the pin deck, has a reference dimension of 62 feet, 10 3/16 inches, measured from the lane side of the foul line to the rear edge of the pin deck (not including the tail plank).
2. It must be 60 feet, plus/minus 1/2 inch, from the lane side of the foul line to the center of the No. 1 pin spot.
3. It must be 34 3/16 inches, plus/minus 1/16 inch, from the center of the No. 1 pin spot to the rear edge of the pin deck (not including the tail plank).

## Width:

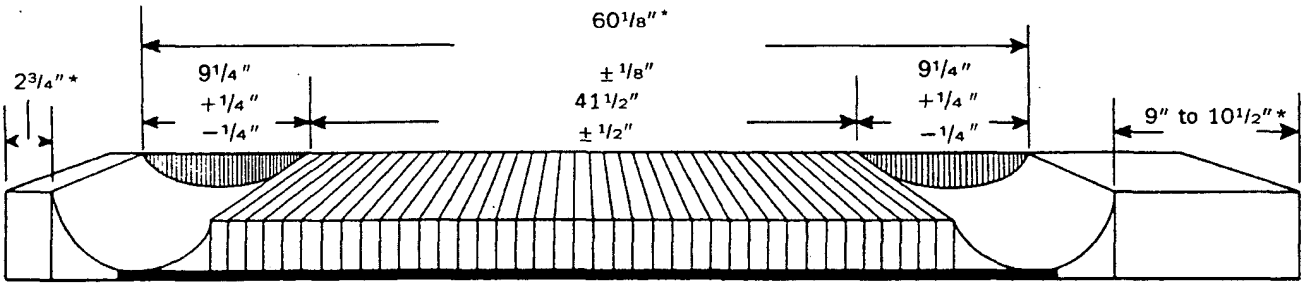
The lane shall be 41 1/2 inches, plus/minus 1/2 inch, wide.

## Surface:

1. The surface must be free of all continuous grooves or ridges.
2. There shall be no depressions or crown in excess of 40/1000 inch on the surface of the lane over a 42 inch span.
3. There shall be no crosswise tilt in excess of the 40/1000 inch over the width of the lane.
4. The same lane finish coating shall be applied from the edgeboard to edgeboard.
5. The Coefficient of Friction of all lane surfaces shall not exceed .29 when measured with an ABC/WIBC approved device.
   All bowling lane finish coatings as well as all synthetic lane surfaces must be submitted to ABC/WIBC for coefficient of friction testing before use in sanctioned competition.
   In addition, all lane surface coatings must bear labels stating "This product complies with ABC/WIBC specifications when applied as directed by the manufacturer."

## ABC/WIBC Regulation Bowling Lane Dimensions

Typical Cross Section of Bowling Lane — Round Gutters from foul line to pin deck area.




*NOTE: This particular measurement is not an ABC/WIBC specification but is an accepted standard for installing bowling lanes.

## Lane and Approach Markings or Designs

Markings or designs on the lanes and approaches shall be permitted in accordance with the following specifications:

1. Measured from the foul line, a maximum of seven (7) guides may be embedded in or stamped on the approach at each of the following points: 2-6 inches; 9-10 feet; 11-12 feet, and 14-15 feet. Each series of guides shall be parallel to the foul line and each guide shall be circular in shape, and shall not exceed 3/4 inch in diameter.
2. At a point 6-8 feet beyond the foul line and parallel thereto, there may be embedded in or stamped on the lane a maximum of ten (10) guides. Each guide shall be uniform, circular in shape, and shall not exceed 3/4 inch in diameter.
3. At a point12-16 feet beyond the foul line, there may be embedded in or stamped on the lane a maximum of seven targets. Each of the targets shall be uniform and may consist of one or more dowels, darts, diamond, triangles or rectangular designs. The overall surface covered by each target shall not be more than 1 1/4 inches in width and 6 inches in length. Each target must be equidistant from one another and set in a uniform pattern.
4. At a point 33-44 feet beyond the foul line, there may be a maximum of four targets. Each target must be uniform in appearance and shall not be wider than a single board nor longer than 36 inches.
5. Embedded markings or designs shall be of wood, fibre or plastic, and shall be flush and level with the surface of the lanes and approaches.
6. When the markings are stamped on wood lanes, they shall be applied to the bare wood and then covered with lacquer, urethane, or similar liquid transparent material generally used in resurfacing . All such installations in any one center shall be uniform as to design and measurement and at least on natural pairs of lanes.

# SYNTHETIC BOWLING LANE

All synthetic bowling lanes much be ABC/WIBC approved and meet all specifications for regulation bowling lanes in addition to the following:

## Identification:

On synthetic lane surfaces, each panel must have at least one label that meets the following requirements:

1. The label, identifying the manufacturer, must be permanent, lasting the life of the product, and clearly visible after it is installed.
2. The label must contain an approval number assigned by ABC/WIBC and state "ABC/WIBC Approved."
3. Overlay and complete systems with the same top surface must have the same approval number.
4. The color of the label can be similar to the colors used in the pattern, as long as they are visible upon close inspection.

## Gaps and Drop Off:

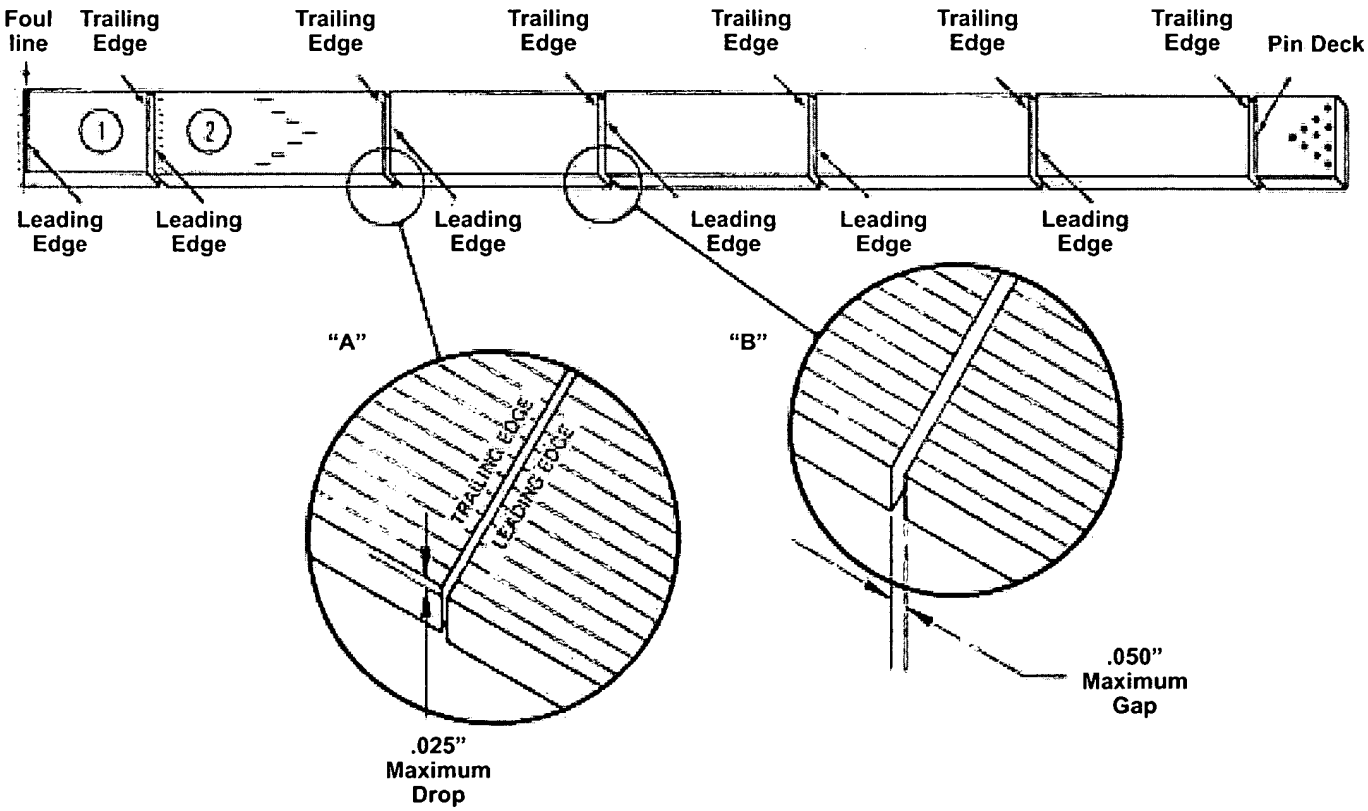
On synthetic lane surfaces, either panelized or overlay, where two panels meet, the following specifications must be met:

1. The leading edge of one panel shall be flush with, or not more than $^{25}/_{1000}$ inch below the trailing edge of the adjoining panel at any point across the width of the lane.
2. The leading edge of the first panel shall be flush with, or not more than $^{80}/_{1000}$ inch below the trailing edge of the foul line at any point across the width of the lane.
3. The gap between the leading and trailing edge of adjoining panels, across the width of the lane, shall not exceed $^{50}/_{1000}$ inch at the time of installation.

   (See the following diagram for description of "leading" and "trailing" edges.)

## Surface:

The surface of a synthetic lane may not be altered (coated) with any material unless first tested and approved.



# PIN DECK AREA

## Composition:

The pin deck may be constructed entirely of hardwood. Synthetic materials, alone or in combination with other materials, may be used provided these materials have been tested and approved by ABC/WIBC.

## Edgeboards:

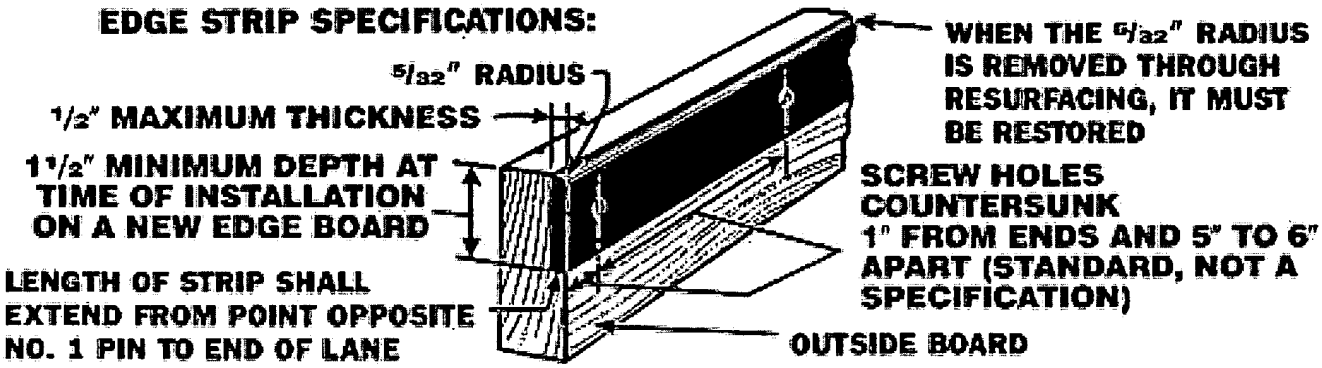
The edgeboards must be rounded on a radius of not more than 5/32 inch. If the radius is removed, such radius must be restored. The edgeboard may be constructed entirely of hardwood without testing. Synthetic materials, alone or in combination with other materials, may be used provided these materials have been tested and approved by ABC/WIBC.

## Synthetic Edge Strip:

A synthetic edge strip, measuring not more than 1/2 inch in thickness and:

1. not less than 1 1/2 inches in depth, at time of installation on a new edgeboard
2. not less than 1 inch in depth, at time of installation on an existing edgeboard

May be attached to the side of the pin deck nearest the gutters and at a minimum, shall extend from a point opposite the No. 1 pin to the pit. It must be installed vertically so the synthetic material exposed on the pin deck surface is not in excess of 1/2 inch.




## Synthetic Pin Decks:

If the pin deck surface includes the tail plank, the end of the lane must be visibly identified with a minimum mark of at least 2 inches in length on the 10 pin side of the pin deck for the life of the pin deck.

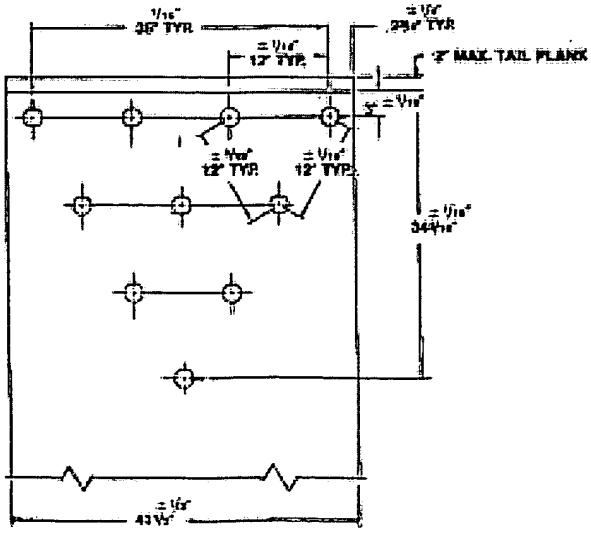
If nonwood pin decks are in use with either wood or non wood lane surfaces, the leading edge of the pin deck must be flush with to not more than 25/1000 inch below the trailing edge of the adjoining lane section across the width of the lane.

The gap between the pin deck and the adjoining lane section, across the width of the lane, shall not exceed 50/1000 inch.

## Pin Spots:

All pin spots, upon which the pins must be set, shall be clearly identified for the life of the pin deck and be 2 1/4 inches in diameter, plus/minus 1/16 inch, and meet the following location specifications:

1. Spaced 12 inches plus/minus 1/16 inch, (non accumulative) in an equilateral triangular.
2. 3 inches, plus/minus 1/16 inch, from the center of 7, 8, 9 and 10 pin spots to the pit (not including the tail plank).
3. 2 3/4 inches, plus/minus 1/4 inch, from the center of the 7 and 10 pin spots to the adjacent side of the pin deck.
4. 12 1/16 inches, plus/minus 1/16 inch, from the center of the 7 and 10 pin spots to the nearest kickback.
5. The No. 1 pin spot shall be equidistant from both edges of the lane and both kickbacks with a tolerance of plus/minus 1/8 inch,and never less than 30 inches from its center to the kickbacks.
6. 31 3/16 inches, (reference dimension) from center of the No. 1 pin spot to a perpendicular line drawn through the centers of the back row of spots.
7. 34 3/16 inches from the center of the No. 1 pin spot, to the pit (not including the tail plank).



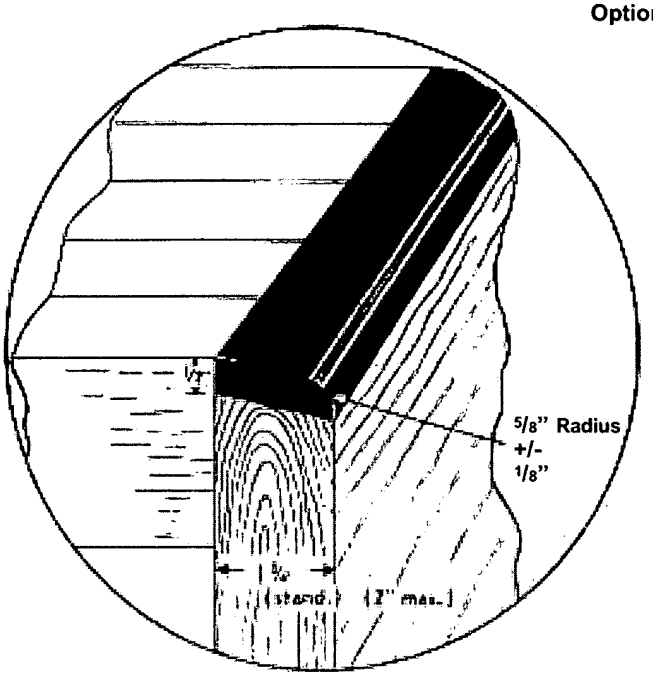
## Tail Plank:

A tail plank, not to exceed 2 inches in thickness, may be attached to the rear of the lane. The tail plank may be constructed entirely of hardwood without testing but synthetic materials, alone or in combination with other materials, must be evaluated by ABC/WIBC before use.

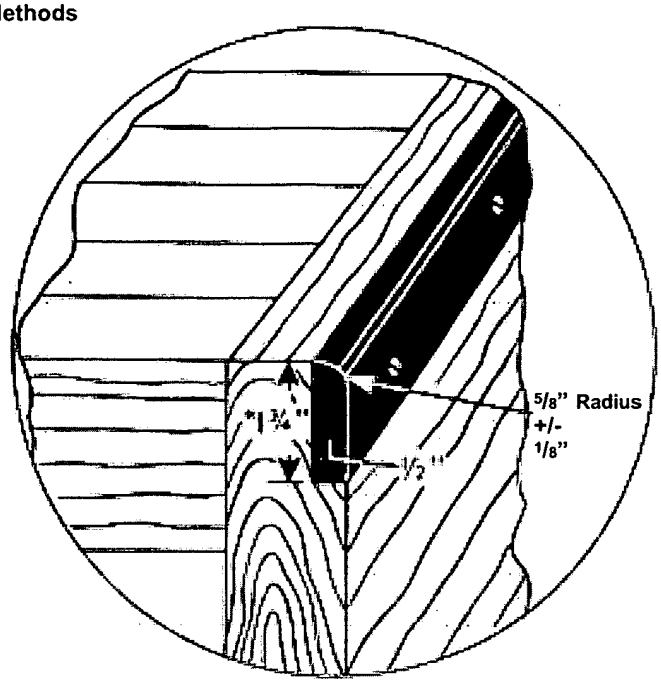
The exposed edge of the tail plank may be covered with a piece of synthetic material which must have a radius of 5/8 inch, plus/minus 1/8 inch at the intersection of the top edge and rear face of the tail plank. At no time may there be more than 5 inches of flat playing surface including the tail plank in back of the centers of the 7, 8, 9, and 10 pin spots.

## REINFORCED TAIL PLANK

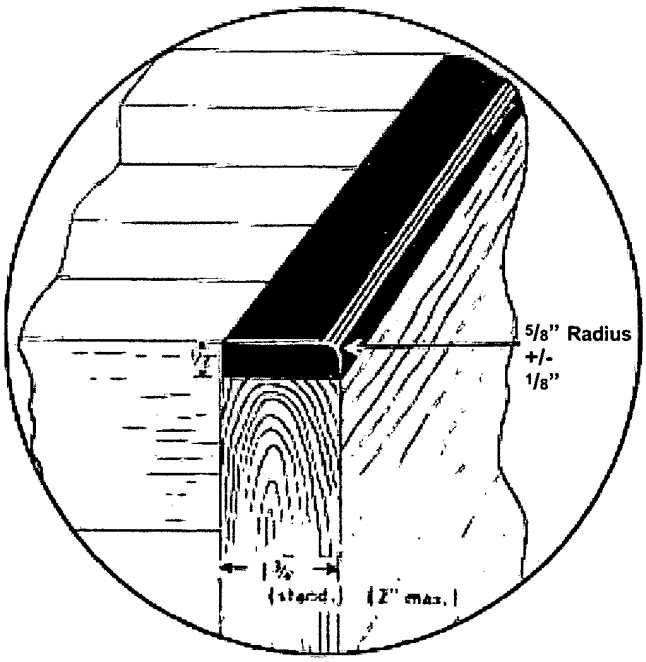
**Optional Methods**



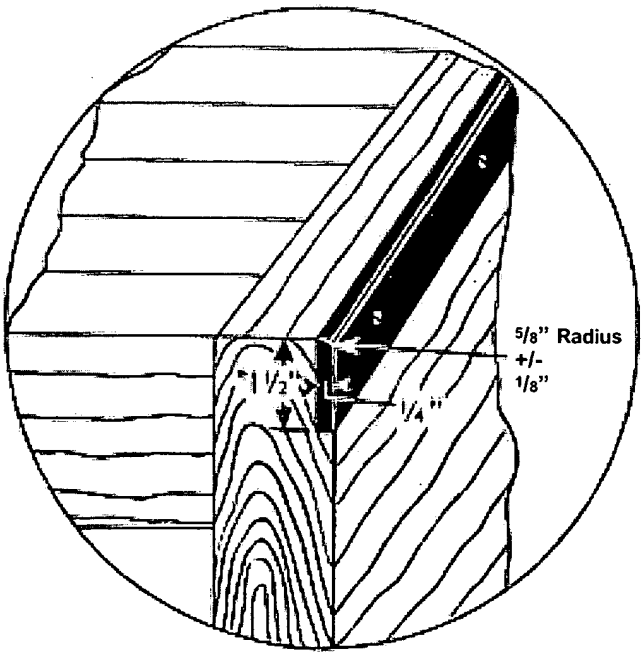

**Fibre or Phenolic Applied on Slanting Joint**




**Fibre or Phenolic Applied on Right Angle Joint**




**Fibre or Phenolic Applied on Exposed Edge**




**Fibre or Phenolic Applied on Exposed Edge**

# GUTTERS

Gutters shall be placed on each side of the lane and shall begin at the foul line and extend parallel with the lane to the pit.

## Round Gutters:

1. The width, shall be 9 1/4 inch, plus/minus 1/4 inch.
2. They must be concave in shape.
3. They must measure at least 1 7/8 inch in depth at center at time of manufacture.

## Flat Gutters:

Flat gutters, must be constructed of wood or other materials which have been tested according to ABC/WIBC procedures for the specified time period and approved.

1. The width shall be 9 1/4 inches, plus/minus 1/4 inch, including the molding.
2. From a point opposite or within 15 inches ahead of the No. 1 pin spot, the gutter must have square bottoms and must be at least 1 7/8 inchbeneath the surface of the lane.
3. Opposite the center of the rear row of pin spots the depth shall be 3 1/2 inches, plus/minus 1/8 inch.

## Reinforced Flat Gutters:

1. The dimensions shall be the same as flat gutters.
2. The reinforcing material may cover the entire length and width of the bottom, or be 4 inches, plus/minus 1/2 inch, in width and cover the total length.
3. If vulcanized fibre reinforcing is used, it shall not exceed 3/16 inch in thickness.
4. If laminated phenolic reinforcing, Grade "C" or "CE", is used, it shall not exceed 1/8 inch in thickness.

## Flat Gutter Molding: (Solid Hardwood)

A strip of molding extending the entire length of the flat gutter shall be securely fastened to the bottom of the flat gutter. The molding may be constructed entirely of hardwood without testing. Synthetic materials, alone or in combination with other materials, which have been approved by ABC/WIBC after testing may be used.

1. They may not exceed 7/8 inch high, at the leading edge, gradually increasing to a maximum of 1 1/2 inches high opposite the 7 and 10 pin spots. (Measured from the top surface of the flat gutter to the top of the molding.
2. They may not exceed 3/4 inch in width.
3. The top exposed edge shall be rounded to a radius of 5/8 inch, plus/minus 1/8 inch.

**Reinforced gutter optional methods**

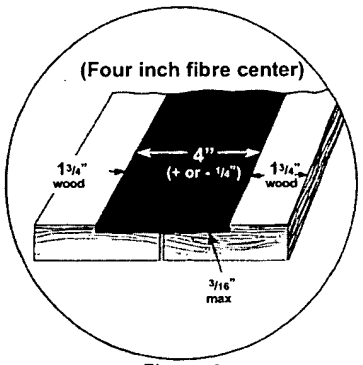



Figure A

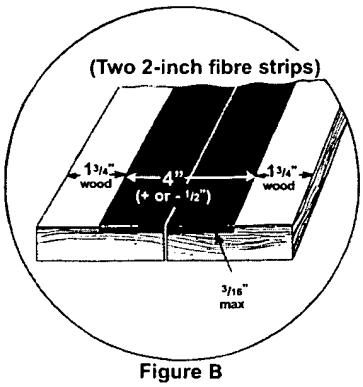



Figure B

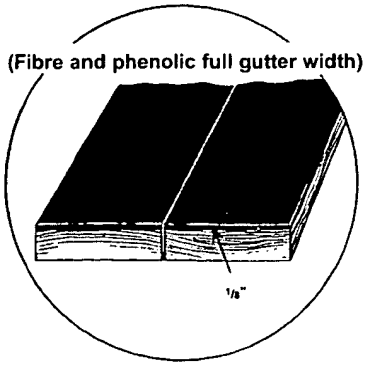



Figure C

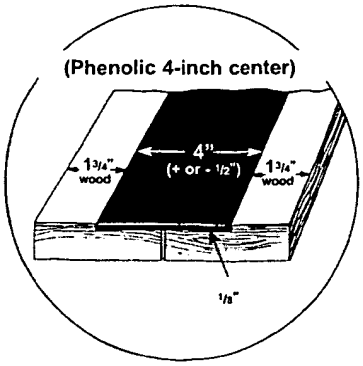



Figure D

## Reinforced Flat Gutter Molding:

1. They must meet all physical dimensions of solid hardwood flat gutter molding.
2. The wearing surface may be reinforced from the pit to at least the point opposite the No. 1 pin spot.
3. If vulcanized fibre is used, it may not exceed 1/4 inch when used on the side or 1/2 inch thick when used on the top. (See drawing)
4. If laminated phenolic material Grade "C" or "CE" is used, it shall be 1/8 inch thick.

## Kickbacks:

The kickback may be constructed entirely of hardwood without testing. Synthetic materials, alone or in combination with other materials which have been approved ABC/WIBC after testing may be used. The kickbacks, or side partitions, shall be placed parallel to the lane and shall meet the following requirements:

1. It shall extend from a point opposite or within 15 inches ahead of the No. 1 pin spot to the rear cushion wall.
2. The distance between the wood faces of the two kickbacks shall be 60 1/8 inches, plus/minus 1/8 inch.
3. The height above the lane shall be 20 1/2 inches, plus/minus 3 1/2 inches.

The kickbacks, behind the tail plank, may be covered with impregnated fibre glass, hard vulcanized fibre, or laminated phenolic (Grade "C" or "CE").

## Kickback Plates:

The kickbacks may be covered with a single layer of reinforcing material, not to exceed 3/16 inch in thickness. The following materials may be used:

1. Hard vulcanized fibre.
2. Laminated phenolic (Grade "C" or "CE").
3. Rigid thermoplastic vinyl copolymer.

Other materials, may be used provided they have been tested and approved by ABC/WIBC.

## Rear Cushion:

The rear cushion shall in all cases be covered with material of a dark color and shall be so constructed as to prevent the pins from rebounding onto the lane. (For pit and rear cushion measurements on automatic pinsetting devices see section on Automatic Pinsetting devices in this manual.)

## Pit:

1. For lanes without automatic pinsetting devices, there shall not be less than 10 inches from the pit floor to the top of the lane and it shall not be less than 9 1/2 inches from the top of the pit mat to the top of the lane. The pit shall not be less than 30 inches in depth from the rear edge of the lane (including the width of the tail plank as a portion of the measurement) to the face of the rear cushion.
2. For lanes with automatic pinsetting devices, see the diagrams on page 12.

**Reinforced Gutter Molding**
**Optional Methods**

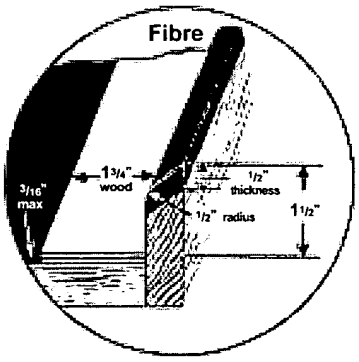



Figure A

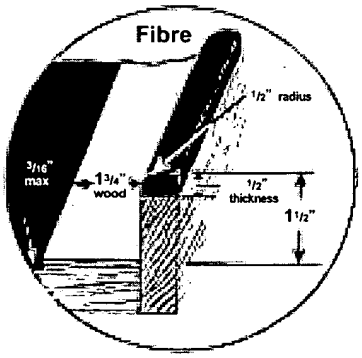



Figure B

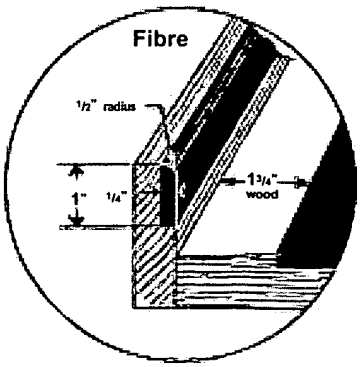



Figure C

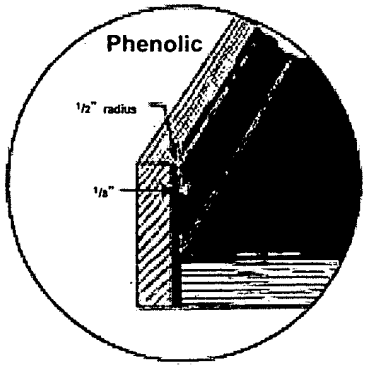
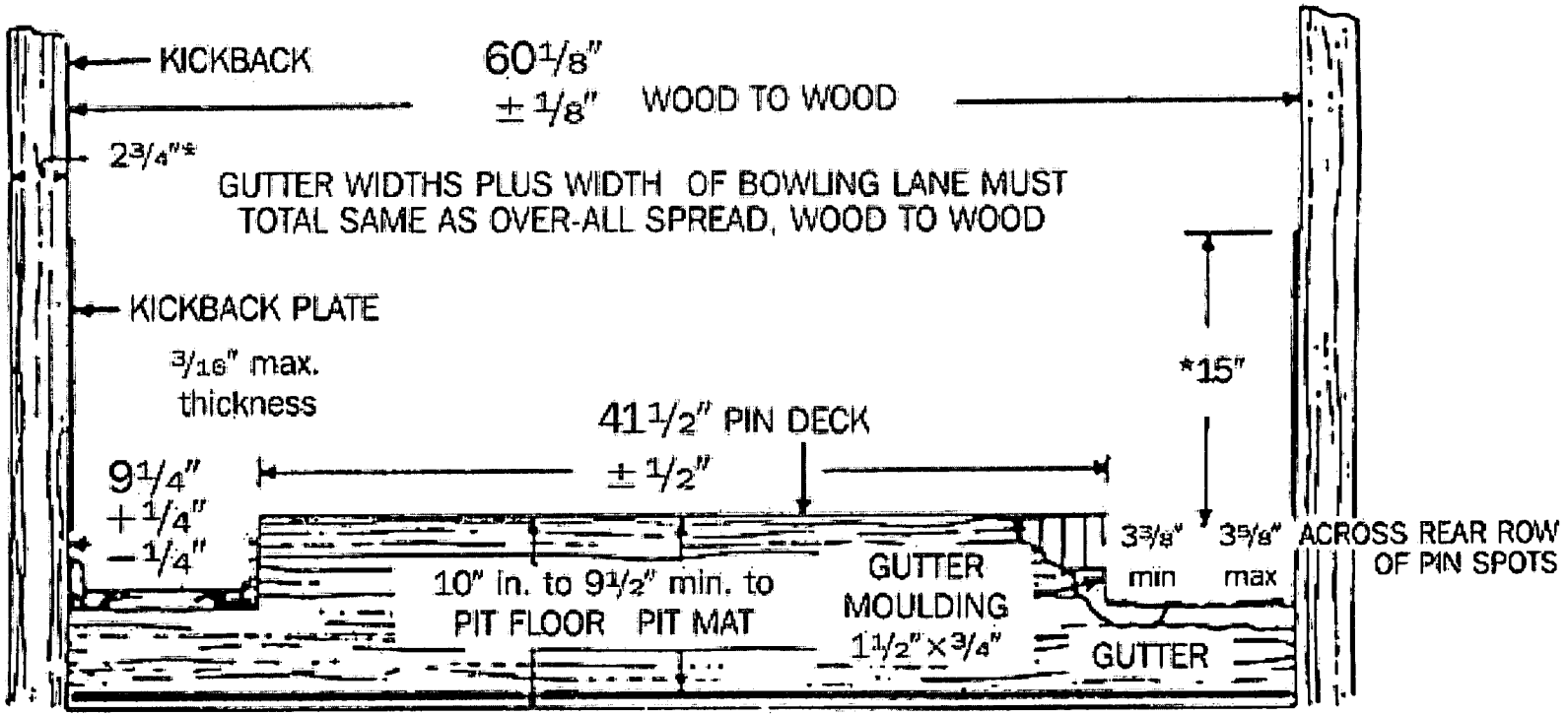



Figure D

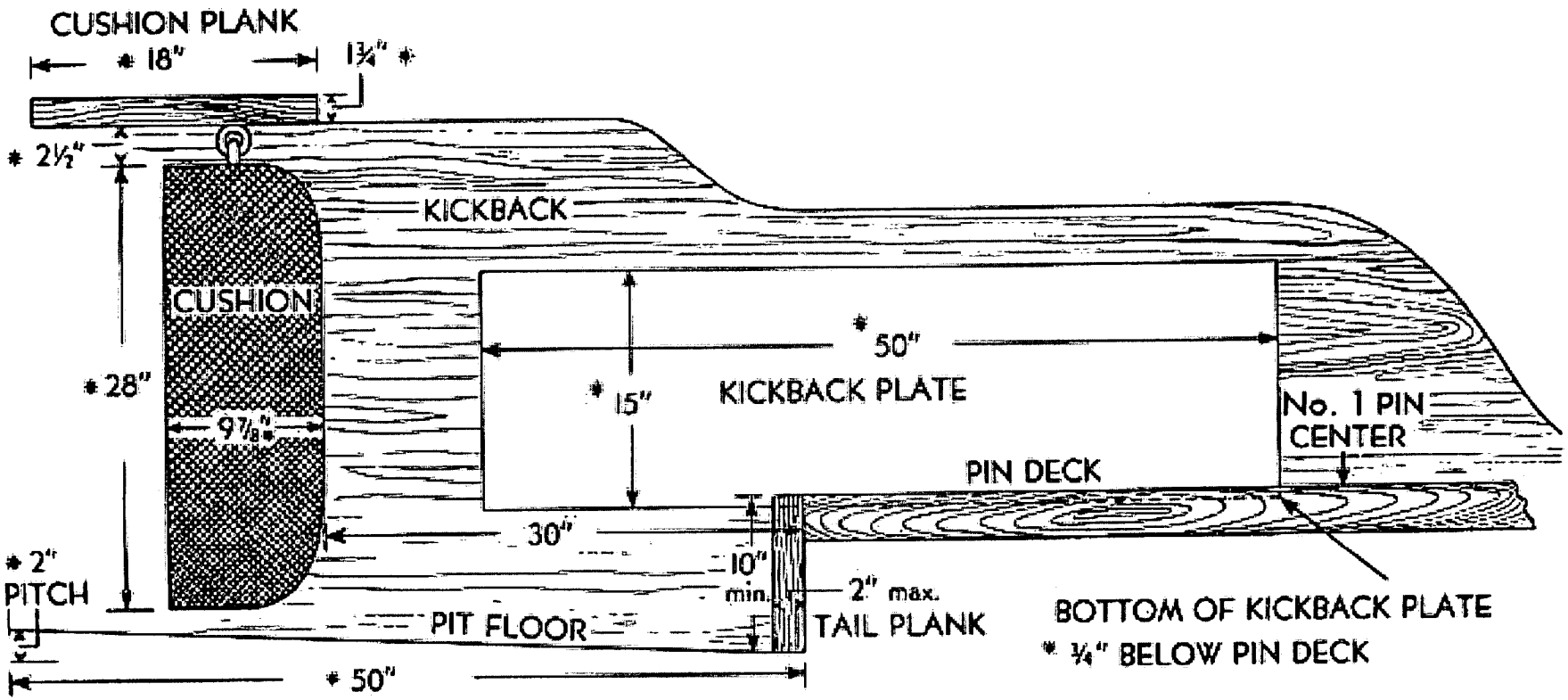
*Note: These are not specifications but accepted standards
For installing bowling lanes.

# REGULATION BOWLING LANE DIMENSIONS PIT END VIEW



# REGULATION BOWLING LANE DIMENSIONS

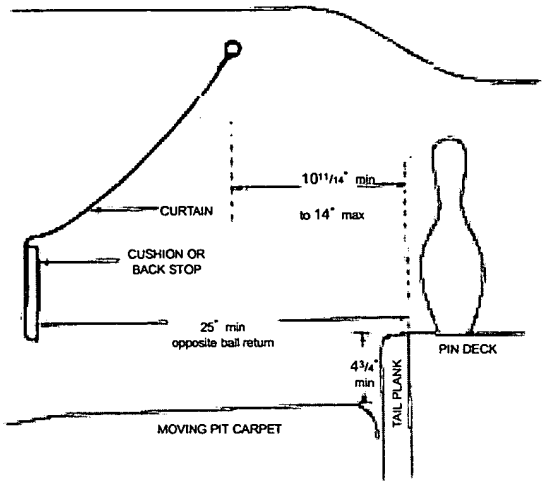
Side View - Pit End



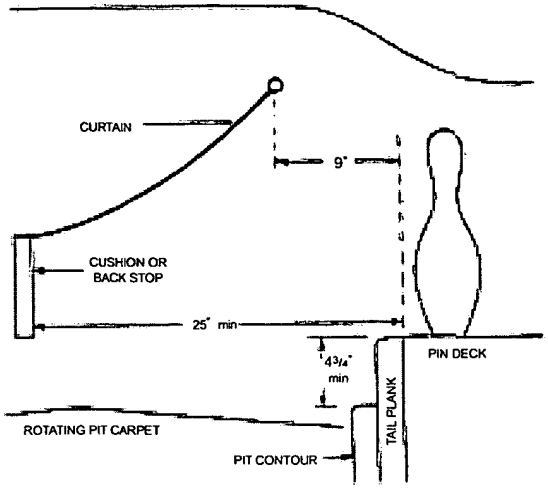

*Note: This particular measurement is not an ABC/WIBC specification but is an accepted standard for installing bowling lanes

# PIT MEASUREMENTS — AUTOMATIC PINSETTING DEVICE

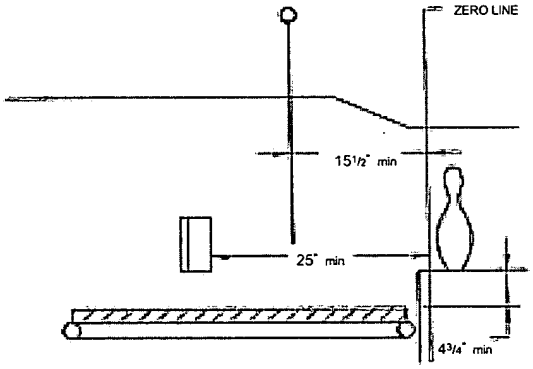
### AMF/VANTAGE



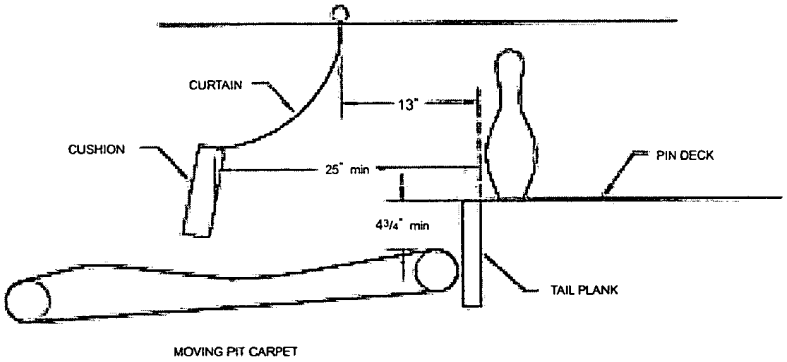

### BOWL-MOR, and Z-3



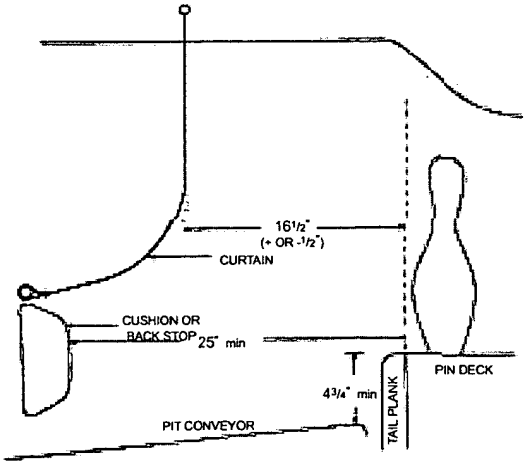

### HEDDON H-300-R




### MENDES MM-2001




### BRUNSWICK, HEDDON H-4, DACOS




### BRUNSWICK GS-10